MACTEC ENVIRONMENTAL RESTORATION SERVICES, LLC

Spectral Gamma-Ray Borehole Log Data Report

Log Event A

Borehole 50-00-10

Borehole Information

Farm : T	**Tank :** T	**Site Number :** 299-W10-54
N-Coord : 43,584	**W-Coord :** 75,907	**TOC Elevation :** 671.61
Water Level, ft :	**Date Drilled :** 10/31/1944	

Casing Record

Type :	Steel-welded	Thickness, in. :	0.258	ID, in. :	5
Top Depth, ft. :	0	Bottom Depth, ft. :	150		
Type :	Steel-welded	Thickness, in. :	0.280	ID, in. :	6
Top Depth, ft. :	0	Bottom Depth, ft. :	150		

Cement Bottom, ft. : 150 **Cement Top, ft. :** 0

Borehole Notes:

Borehole 50-00-10 was drilled in October 1944 to a total depth of 150 ft. Data from the drilling log and Chamness and Merz (1993) were used to provide borehole construction information. The borehole was telescoped to total depth using 12-in., 10-in., and 6-in. casings. The 12-in. and 10-in. casings were driven to depths of 96 and 149 ft, respectively. The 6-in. casing was installed inside the larger casings to a depth of 150 ft. The 10-in. and 12-in. casings were then removed and the bottom of the 6-in. casing was sealed with half a sack of cement. The drilling log reports that the 6-in. casing was pre-perforated from 50 to 150 ft. The logging engineer reports that a single 5-in.-diameter casing was visible at the ground surface, suggesting that the original 6-in. borehole casing contains a 5-in. casing liner. However, the depth to which the casing liner extends is unknown. The thicknesses of the 5-in. and 6-in. casings are presumed to be 0.258 in. and 0.280 in., respectively, on the basis of the published thickness for schedule-40, 5-in. and 6-in. steel tubing.

Equipment Information

Logging System : 2B	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 11/1997	**Calibration Reference :** GJO-HAN-20	**Logging Procedure :** MAC-VZCP 1.7.10-1

Logging Information

Log Run Number : 1	**Log Run Date :** 03/13/1998	**Logging Engineer:** Alan Pearson
Start Depth, ft.: 0.0	**Counting Time, sec.:** 200	**L/R :** L **Shield :** N
Finish Depth, ft. : 15.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

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Log Run Number :	2	**Log Run Date :**	03/16/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	14.0	**Counting Time, sec.:**	200	**L/R :** L **Shield :**	N
Finish Depth, ft. :	50.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a
Log Run Number :	3	**Log Run Date :**	03/17/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	49.0	**Counting Time, sec.:**	200	**L/R :** L **Shield :**	N
Finish Depth, ft. :	103.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a
Log Run Number :	4	**Log Run Date :**	03/18/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	137.0	**Counting Time, sec.:**	200	**L/R :** L **Shield :**	N
Finish Depth, ft. :	102.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Logging Operation Notes:

This borehole was logged by the SGLS in four log runs using a 200-s counting time. The top of the borehole casing, which is the zero reference for the SGLS, is approximately flush with the ground surface. The total logging depth achieved was 137.0 ft.

Analysis Information

Analyst : E. Larsen

Data Processing Reference : MAC-VZCP 1.7.9 Analysis Date : 07/06/1998

Analysis Notes :

The pre-survey and post-survey field verification for each logging run met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from the accepted calibration spectrum that most closely matched the field data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

For purposes of data analysis, it was assumed that 5-in. and 6-in. casings are both present in the borehole. A casing correction factor for a 0.50-in.-thick steel casing was applied to the concentration data because it most closely matched the 0.538-in. total combined thickness of the 5-in. and 6-in. casings.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the estimated uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the

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spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

Results/Interpretations:

The radionuclide concentrations identified in this section are reported as only apparent concentrations and are underestimated.

The man-made radionuclide Cs-137 was detected by the SGLS. The Cs-137 contamination was measured continuously from the ground surface to a depth of 17 ft. An isolated occurrence of Cs-137 was detected from 115.5 to 116 ft.

Increased Th-232 concentrations occur from 82 to 91 ft. Decreased K-40 concentration values occur between 90 and 96.5 ft. The K-40 concentrations decrease sharply between 98 and 104 ft. A peak in the U-238 concentration values occurs at 102.5 ft. An increase in the K-40 and Th-232 concentrations occurs between 106 and 110 ft. Slightly decreased K-40 and Th-232 concentration values occur below about 121 ft.

Sharply decreased U-238 concentration values occur below about 15 ft and again below about 50 ft. The change in concentrations corresponds with the beginning or end of individual logging runs.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank T-106.